

WHAT IS CLAIMED IS:

1. A method for validating data from a remote vehicle emission sensing device, comprising the steps of:

obtaining data from at least one remote vehicle emission sensing device including at least vehicle emission data:

validating at least a part of the data by inspection of at least some of said vehicle emission data, wherein the step of validating the data comprises one or more of:

- a) checking for insufficient exhaust plume,
- b) checking for a calibration error,
- c) checking for improper optical component alignment,
- d) checking for inordinately low or high readings for one or more exhaust components,
- e) checking for large variations between different readings taken for the same exhaust plume,
- f) determining whether there is a second source of emissions present,
- g) determining whether vehicle speed criteria are met,
- h) determining whether vehicle acceleration criteria are met, and
- i) determining whether ambient or local conditions have significantly influenced the data collected;

designating that the vehicle emission data either:

- i) meets predetermined quality assurance criteria; or
- ii) does not meet predetermined quality assurance criteria; and

providing an indication that said data has been validated.

2. The method according to claim 1, wherein the obtained data comprises vehicle identification data, and

wherein the step of validating at least part of the data comprises inspection of the vehicle identification data.

3. The method according to claim 2, wherein the vehicle identification data comprises data selected from license plate data and image data; and

wherein the step of validating further comprises determining a license plate number based on an inspection of at least some of the vehicle identification data.

4. The method according to claim 1, further comprising the steps of:

matching vehicle identification data with the appropriate vehicle emission data based on inspection of at least a portion of the vehicle identification data; and

combining the vehicle identification data and the vehicle emission data.

5. The method according to claim 1, wherein the step of validating the data comprises two or more of:

a) checking for insufficient exhaust plume,

b) checking for a calibration error,

c) checking for improper optical component alignment,

d) checking for inordinately low or high readings for one or more exhaust components,

e) checking for large variations between different readings taken for the same exhaust plume,

f) determining whether there is a second source of emissions present,

g) determining whether vehicle speed criteria are met,

h) determining whether vehicle acceleration criteria are met, and

i) determining whether ambient or local conditions have significantly influenced the data collected.

6. The method according to claim 1, wherein the step of validating the data comprises three or more of:

- a) checking for insufficient exhaust plume,
- b) checking for a calibration error,
- c) checking for improper optical component alignment,
- d) checking for inordinately low or high readings for one or more exhaust components,
- e) checking for large variations between different readings taken for the same exhaust plume,
- f) determining whether there is a second source of emissions present,
- g) determining whether vehicle speed criteria are met,
- h) determining whether vehicle acceleration criteria are met, and
- i) determining whether ambient or local conditions have significantly influenced the data collected.

7. The method according to claim 1, wherein the step of validating the data comprises four or more of:

- a) checking for insufficient exhaust plume,
- b) checking for a calibration error,
- c) checking for improper optical component alignment,
- d) checking for inordinately low or high readings for one or more exhaust components,
- e) checking for large variations between different readings taken for the same exhaust plume,
- f) determining whether there is a second source of emissions present,

- g) determining whether vehicle speed criteria are met,
- h) determining whether vehicle acceleration criteria are met, and
- i) determining whether ambient or local conditions have significantly influenced the data collected.

5 S. The method according to claim 1, wherein the step of validating the data comprises five or more of:

- a) checking for insufficient exhaust plume,
- b) checking for a calibration error,
- c) checking for improper optical component alignment,
- 10 d) checking for inordinately low or high readings for one or more exhaust components,
- e) checking for large variations between different readings taken for the same exhaust plume,
- f) determining whether there is a second source of emissions present,
- 15 g) determining whether vehicle speed criteria are met,
- h) determining whether vehicle acceleration criteria are met, and
- i) determining whether ambient or local conditions have significantly influenced the data collected.

9. The method according to claim 1, wherein the step of validating the data comprises
20 six or more of:

- a) checking for insufficient exhaust plume,
- b) checking for a calibration error,
- c) checking for improper optical component alignment,
- 25 d) checking for inordinately low or high readings for one or more exhaust components,

- e) checking for large variations between different readings taken for the same exhaust plume.
- f) determining whether there is a second source of emissions present.
- g) determining whether vehicle speed criteria are met.
- h) determining whether vehicle acceleration criteria are met, and
- i) determining whether ambient or local conditions have significantly influenced the data collected.

10. The method according to claim 1, wherein the step of validating the data comprises seven or more of:

- a) checking for insufficient exhaust plume,
- b) checking for a calibration error,
- c) checking for improper optical component alignment,
- d) checking for inordinately low or high readings for one or more exhaust components,
- e) checking for large variations between different readings taken for the same exhaust plume,
- f) determining whether there is a second source of emissions present,
- g) determining whether vehicle speed criteria are met,
- h) determining whether vehicle acceleration criteria are met, and
- i) determining whether ambient or local conditions have significantly influenced the data collected.

11. The method according to claim 1, further comprising the step of maintaining the chain of custody of the vehicle emission data and vehicle identification data in a manner sufficient to allow introduction of the validated data as evidence in a legal proceeding.

12. The method according to claim 1, further comprising the step of calibrating the remote vehicle emission sensing device immediately prior to obtaining the vehicle emission data.

13. The method according to claim 1, further comprising the steps of:

deleting inaccurate data;

identifying patterns of inaccurate data; and

suggesting reasons for inaccurate data.

14. A method for validating information from a remote vehicle emission sensing device, comprising the steps of:

sensing emissions from a vehicle at the remote sensing device to create emissions data;

obtaining an image of a license plate of a vehicle at the remote sensing device to create image data;

combining the emissions data and image data;

forwarding the combined data to a processing station;

displaying the combined data at the processing station;

validating at least part of the combined data by inspection, wherein the step of validating comprises:

a) reviewing the vehicle emission data for reliability;

b) comparing the vehicle emission data to predetermined data ranges to

ensure that the vehicle emission data meets predetermined quality assurance criteria; and

c) designating that the vehicle emission data either:

i) meets predetermined quality assurance criteria; or

ii) does not meet predetermined quality assurance criteria; and

forwarding the validated data to a data storage location.

15. The method according to claim 14, wherein the step of validating the combined data further comprises the steps of:

determining the license plate data from the image data; and

providing an indication that the combined data has been validated.

16. The method according to claim 14, wherein the step of validating the combined data comprises the step of ensuring that a minimum amount of reliable emissions data has been obtained.

17. The method according to claim 16, wherein the step of comparing the vehicle emission data to predetermined data ranges comprises checking for one or more of: insufficient exhaust plume, calibration error, improper optical component alignment, inordinately low or high readings for one or more exhaust components, large variations between different readings taken for the same exhaust plume, whether there is a second source of emissions present, whether vehicle speed criteria are met, whether vehicle acceleration criteria are met, and whether ambient or local conditions have significantly influenced the data collected.

18. A system for validating data from a remote vehicle emission sensing device, the system comprising:

a remote vehicle emission sensing device for remotely obtaining vehicle emission data from the exhaust plume of a vehicle;

means for validating at least a part of the vehicle emission data by inspection of said data, wherein validating comprises:

a) comparing the vehicle emission data to predetermined data ranges to ensure that the vehicle emission data meets predetermined quality assurance criteria; and

b) designating that the vehicle emission data either:

i) meets predetermined quality assurance criteria; or

ii) does not meet predetermined quality assurance criteria; and

means for providing an indication that said data has been validated.

5 19. The system according to claim 18, further comprising means for obtaining vehicle identification data, and

wherein the means for validating at least part of the data comprises a means for inspection of the vehicle identification data.

10 20. The system according to claim 19, wherein the vehicle identification data comprises license plate data; and

wherein the means for validating further comprises means for determining a license plate number based on the license plate data.

21. The system according to claim 18, further comprising:

15 means for matching vehicle identification data with the appropriate vehicle emissions data based on inspection of the vehicle identification data; and

means for combining the vehicle identification data and the vehicle emissions data.

22. The system according to claim 21, wherein:

a) the vehicle identification data comprises vehicle image data; and

b) the means for validating the data further comprises means for determining a

20 license plate number based on the vehicle image data.

23. The system according to claim 18, further comprising:

means for obtaining image data of the same vehicle from which the vehicle emission data was obtained; and

25 means for combining the vehicle emission data and the image data prior to validating at least some of the data.

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24. The system according to claim 18, wherein the means for validating vehicle emission data includes the means for ensuring that a minimum amount of reliable vehicle emission data has been obtained.

25. The system according to claim 24, wherein the means for ensuring that a minimum amount of reliable vehicle emission data has been obtained includes means to ensure that one or more of the following conditions is not present:

- a) insufficient exhaust plume,
- b) calibration error,
- c) improper optical component alignment,
- d) inordinately low or high readings for one or more exhaust components,
- e) large variations between different readings taken for the same exhaust plume,
- f) whether there is a second source of emissions present,
- g) whether vehicle speed criteria are met,
- h) whether vehicle acceleration criteria are met, and
- i) whether ambient or local conditions have significantly influenced the data collected.

26. The system according to claim 25, further comprising means for indicating the cause of vehicle emission data being determined to be unreliable by said means for ensuring the reliability of the vehicle emissions data.

27. The system according to claim 18, wherein the vehicle identification data includes image data and license plate data obtained by an automatic license plate reader.

28. The system according to claim 27, wherein the means for validating further comprises:

- a) means for comparing the license plate data and the image data;

- b) means for correcting the license plate data when the image data is inconsistent with the license plate data; and
- c) means for confirming that the license plate data and the image data are consistent.

29. The system according to claim 18, further comprising the means for maintaining the chain of custody of the vehicle emission data and vehicle identification data in a manner sufficient to allow introduction of the validated data as evidence in a legal proceeding.

30. The system according to claim 18, further comprising means for calibrating the remote vehicle emission sensing device prior to obtaining the vehicle emission data.

31. The system according to claim 18, further comprising:

- means for deleting inaccurate data;
- means for identifying patterns of inaccurate data; and
- means for suggesting reasons for inaccurate data.

32. A system for processing information from a remote vehicle emission sensing device comprising:

- means for obtaining an image of a license plate of a vehicle at the remote sensing device to create image data;

- means for automatically reading the license plate to create license plate data;

- means for combining the emissions data, image data, and license plate data;

- means for forwarding the combined data to a processing station;

- means for displaying the combined data at the processing station;

- means for validating the combined data by inspection, wherein validating comprises:

- a) comparing the vehicle emission data to predetermined data ranges to ensure that the vehicle emission data meets predetermined quality assurance criteria; and

b) designating that the vehicle emission data either:

- i) meets predetermined quality assurance criteria; or
- ii) does not meet predetermined quality assurance criteria; and

means for forwarding the validated data to a data storage location.

33. The system according to claim 32, wherein the means for validating the combined data further comprises:

means for comparing the license plate data and the image data;

means for correcting the license plate data when the image data is inconsistent with the license plate data;

means for confirming that the license plate data and the image data are consistent; and

means for providing an indication that the combined data has been validated.

34. The system according to claim 32, wherein the means for validating the combined data further comprises means for ensuring that a minimum amount of reliable emissions data has been obtained.